New US Continuation Application
Filed March 12, 2004
Preliminary Amendment dated March 12, 2004

Amendments to the Specification

Please replace the paragraph beginning on page 1, line 4 with the following amended paragraph:

This application is a continuation of co-pending U.S. Patent Application Serial Number 10/316,710, filed December 10, 2002 and entitled "Circuit Using Current Limiting to Reduce Power Consumption of Actuator with DC Brush Motor", which is a continuation of ~~an application filed November 21, 2000,~~ U.S. Patent Application Serial Number 09/717,564 ~~with the same title and same inventors~~, filed November 21, 2000, also entitled "Circuit Using Current Limiting to Reduce Power Consumption of Actuator with DC Brush Motor", now U.S. Patent No. 6,593,716, both of which are assigned to the assignee of the present invention and both of which are incorporated herein by reference.

Please replace the paragraph beginning on page 1, line 16 with the following paragraph:

In a co-pending patent application of Christopher M. Lange entitled "Drive Circuit And Method For an Electric Actuator With Spring Return" Serial Number 08/904,005, filed July [13]31, 1997, issued June 19, 2001 as U.S. Patent No. 6,249,100B1 and assigned to the assignee of the present invention, an actuator system is shown in which an output shaft is positioned by a spring in a first position and upon command, is driven through a gear train to a second position by an electric motor. The circuit includes an input circuit for providing a current large enough to rotate the shaft against the force of the spring. A rotation sensor produces a signal when the motor and shaft are stalled at the second position and a modulation circuit receiving the signal

from the rotation sensor operates to reduce the current to the motor so as to hold the stalled shaft and motor at the second position with a minimum of energy usage. In some applications, this circuit is intended for use in high ambient temperature conditions and accordingly, the rotation sensor utilizes a Hall effect device known to be able to withstand high temperatures. The use of a Hall effect device involves some undesirable features because it is undesirably complicated to implement and is slower than desired. The increased current to the motor at the stalled condition produces an increased torque that can over stress the gear train, at least temporarily, and gear damage may result.

Please replace the paragraph beginning on page 3, line 18 with the following paragraph:

A pair of Zener diodes, 44 and 45, and a conventional diode, 46, are connected in series, cathode to cathode, across input terminals, 28 and 34, of motor, 30, to provide a current circulation path which limits the voltage induced across the windings of motor, 30, when the load switch, 32, switches to a non-conducting state. Also, during spring return, defined as the movement from the second position back to the first position, the Zener diodes, 44 and 45, help limit the speed of return. A circuit 48, labeled "Zener Diode Bypass", is shown connected by a line, 50, to the intersection between Zener diode, 45, and conventional diode, 46. Line, 50, is connected through a resistor, 52, and a resistor, 54, connected in series, to the collector of an NPN transistor, 56, the emitter of which is connected to signal ground. The base of transistor, 56, is connected to the junction between resistors a pair of resistors, 58 and 59, connected between the voltage source VCC and signal ground. Connected across Zener diodes, 44 and 45,

is a FET, 60, having its gate electrode connected to the junction between resistors 52 and 54, its source electrode connected to line, 50, and its drain electrode connected to line, 26. As mentioned, the speed of the return of motor, 30, to its starting position is controlled by Zener diodes 44 and 45. However, when the system is operating to drive the motor, i.e., during powered operation, the flyback current would pass through the Zener diodes, 44 and 45, causing extra poser dissipation. Accordingly, a bypass of the Zener diodes is desired during powered operation and the FET, 60, controlled by transistor, 56, provides a path for the current. A more complete explanation of the operation of the Zener diode by pass circuit, 48, may be obtained from our co-pending patent application entitled "Bypass Circuit for use in DC Brush Motor Control" filed November 21, 2000, under [_____] Serial Number 717,864 [___], issued April 9, 2002 as U.S. Patent No. 6,369,540 and assigned to the assignee of the present invention.

Please replace the paragraph beginning on page 11, line 10 with the following paragraph:

Also, as was the case in Figure 1, a pair of Zener diodes, 44 and 45, and a conventional diode, 46, are connected in series, across input terminals, 28 and 34, of motor, 30, to provide a current circulation path which limits the voltage induced across the windings of motor, 30, when the load switch, 32, is in a non-conducting state. Also, during spring return, the Zener diodes, 44 and 45, help limit the speed of return. The Zener Diode Bypass circuit 48 is identical to Figure 1 and its description and operation will not be further described here. Again, it should be noted that this circuit is described and claimed in our, above mentioned, co-pending patent application

entitled "~~Circuit using a MOSFET transistor to bypass Zener diodes in a DC brush motor control~~ Bypass Circuit for use in DC Brush Motor Control."